



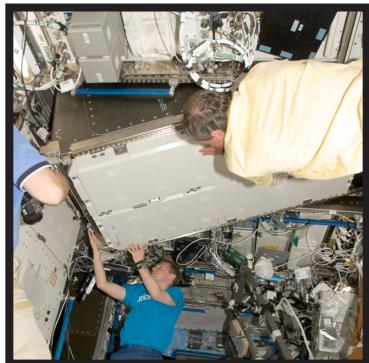
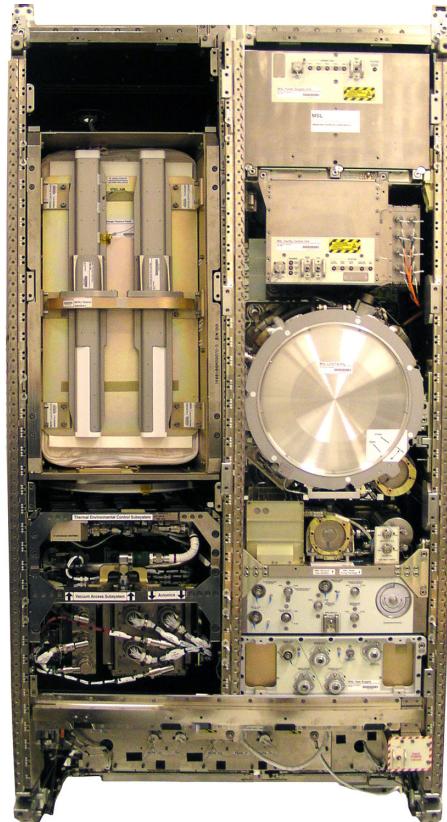
MSRR Rack

Materials Science Research Rack

Overview

The Materials Science Research Rack (MSRR) is a research facility developed under a cooperative research agreement between NASA and the European Space Agency (ESA) for materials science investigations on the International Space Station (ISS). The MSRR is managed at the Marshall Space Flight Center (MSFC) in Huntsville, AL. The MSRR facility subsystems were manufactured by Teledyne Brown Engineering (TBE) and integrated with the ESA/EADS-Astrium developed Materials Science Laboratory (MSL) at the MSFC Space Station Integration and Test Facility (SSITF) as part of the Systems Development Operations Support (SDOS) contract. MSRR was launched on STS-128 in August 2009, and is currently installed in the U. S. Destiny Laboratory Module on the ISS.

Materials science is an integral part of developing new, safer, stronger, more durable materials for use throughout everyday life. The goal of studying materials processing in space is to develop a better understanding of the chemical and physical mechanisms involved, and how they differ in the microgravity environment of space. To that end, the MSRR accommodates advanced investigations in the microgravity environment of the ISS for basic materials science research in areas such as solidification of metals and alloys.



MSRR allows for the study of a variety of materials including metals, ceramics, semiconductor crystals, and glasses. Materials science research benefits from the microgravity environment of space, where the researcher can better isolate chemical and thermal properties of materials from the effects of gravity. With this knowledge, reliable predictions can be made about the conditions required on Earth to achieve improved materials.

MSRR is a highly automated facility with a modular design capable of supporting multiple types of investigations. Currently the NASA-provided Rack Support Subsystem provides services (power, thermal control, vacuum access, and command and data handling) to the ESA developed Materials Science Laboratory (MSL) which accommodates interchangeable Furnace Inserts (FI). Two ESA-developed FIs are presently available on the ISS: the Low Gradient Furnace (LGF) and the Solidification and Quenching Furnace (SQF). Sample-Cartridge Assemblies (SCAs), each containing one or more material samples, are installed in the FI by the crew and can be processed at temperatures up to 1400°C. Once an SCA is installed, the experiment can be run by automatic command or science conducted via telemetry commands from the ground. This facility is available to support materials science investigations through programs such as the US National Laboratory, Technology Development, NASA Research Announcements, and others.

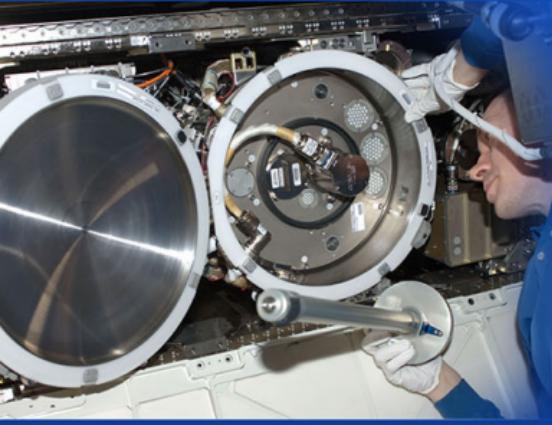
TBE and MSFC are currently developing NASA Sample Cartridge Assemblies (SCA's) with a planned availability for launch in 2017.

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